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## ABSTRACT

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A highly flexible, software-based architecture is disclosed for constructing distributed systems. The architecture supports cooperative task completion by flexible, dynamic configurations of autonomous electronic agents. Communication and cooperation between agents are brokered by one or more facilitators, which are responsible for matching requests, from users and agents, with descriptions of the capabilities of other agents. It is not generally required that a user or agent know the identities, locations, or number of other agents involved in satisfying a request, and relatively minimal effort is involved in incorporating new agents and "wrapping" legacy applications. Extreme flexibility is achieved through an architecture organized around the declaration of capabilities by service-providing agents, the construction of arbitrarily complex goals by users and service-requesting agents, and the role of facilitators in delegating and coordinating the satisfaction of these goals, subject to advice and constraints that may accompany them. Additional mechanisms and features include facilities for creating and maintaining shared repositories of data; the use of triggers to instantiate commitments within and between agents; agent-based provision of multimodal user interfaces including natural language; mechanisms for selecting a most appropriate interpretation from among a plurality of possible interpretations of multimodal inputs; and built-in support for including the user as a privileged member of the agent community. Specialized embodiments providing enhanced scalability are also described. Still other embodiments which allow the facilitator to leverage the services of an incompatible distributed object system or distributed agent are also described, whereby the resources available to the facilitator are greatly enhanced.

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